DMXADP

A compact DMX I/F for PC Parallel Port

Hardware User's Manual
Ver 1.6

(C) DMXEasy - Milan/Bruxelles
http://www.human-interaction.it/lighting

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DMXADP DMX Parallel Port Adapter

Hardware Users's Manual Version 1.6

1. General information

This manual describes the main features and the installation procedure for the DMXADP product hardware.

DMXADP is a compact miniature adapter that allows to interface a **DMX-512** lighting equipment line through a **standard PC parallel port** (**LPT**). It is intended for general purpose DMX interfacing and is offered with different sofware environments for different tasks.

The main feature of DMXADP is to be **intelligent**, meaning that all DMX-512 timing and control tasks are performed by a dedicated microcontroller, to let the main CPU of the PC concentrate to scene fading and sequencing.

The functions accomplished by the DMXADP are the generation of the DMX-512 signal (**Master Mode**) to control a set of devices connected to the line, and the acquisition of the DMX-512 signal (**Slave Mode**) to capture the DMX patterns generated by any traditional console, and let them be processed by software.

All the device functions are automatically managed by dedicated machine-language drivers provided with the hardware or integrated with the software packages (see Appendix B for details).

The DMXADP hardware allows complete control of the **512** channels defined by the DMX-512 standard. The line interface is short circuit and surge voltage protected.

DMXADP is a compact enclosure that connects to the Parallel Port and is externally powered by a 5VDC-150mA source. The standard cabling supports pass-through powering from the Keyboard/Mouse port of the computer letting the keyboard/mouse be usable if required. This lets DMXADP be usable on any PC (either desktop or portable) with no additional equipment. The standard cable is able to universally connect to any keyboard connector configuration.

An optional wall-cube adapter called **ACADAP** is provided in case the keyboard port is not available or not adequate for powering DMXADP. ACADAP is designed to regulate the output of any DC or AC adapter into the +5VDC required by DMXADP.

2. Unpacking and Installing

The DMXADP package (code ADPBPK, see Appendix C) contains the following items:

1. the DMXADP unit;
2. a DMX-Power cable (shipped already attached to the base unit);
3. adapters for DIN keyboard connectors;
4. floppy disk(s) with Test Software and User's Manuals.

Before installing DMXADP, verify that all of the items above are present and in good conditions. For any problem, refer to the DMXADP dealer.

Figure 1 shows the external aspect of the DMXADP unit, outlining the connectors and indicators accessible by the user.

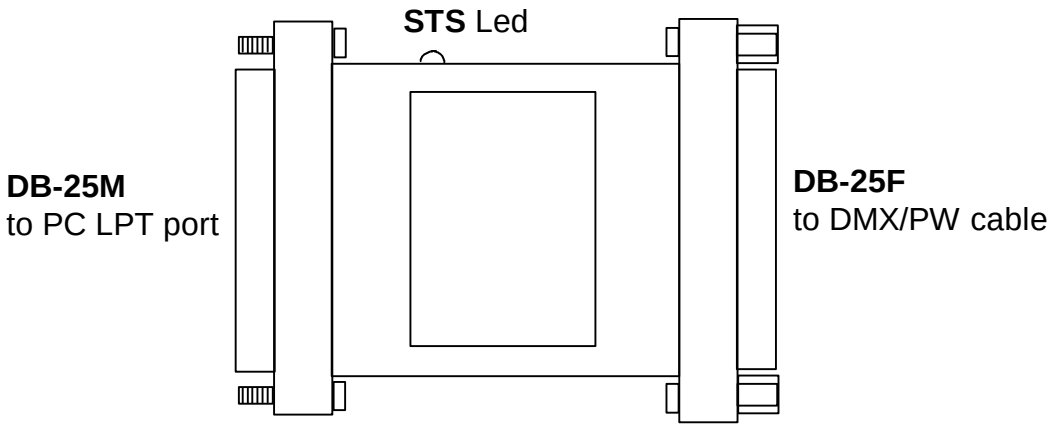

Figure 1 - DMXADP external view

As show, DMXADP is a very compact enclosure using the same packaging of popular RS-232 gender-changer adapters. This makes moving across different computers very easy.

The external connections are done to the LPT port with the **DB-25M** male connector side and to the DMX/Power cable with the **DB-25F** side. In the standard shipping configuration, the DMX/Power cable is already attached at the base unit, and it may be remoded for troubleshooting if required.

The only user visible indicator is the **STS** Led used that provides a visual indication of the DMX line traffic.

The installation process is accomplished through the following steps:

1. Turn-off the computer.
2. Connect DMXADP to the LPT port of the PC.
3. Connect the DMX-PW cable to the DMX line and to the Keyboard-Mouse port. The shipped PS/2 to DIN adapters may be removed in case of PS/2 KBD/Mouse ports. If removed, save them in a safe place for future use of DMXADP on DIN-type KBD/Mouse ports.

Figure 2 shows the external connections of DMXADP once installation is complete (the case of use with the Intelligent Cable option is shown, with the Base Cable a separate DMX termination plug is required for Master mode applications).

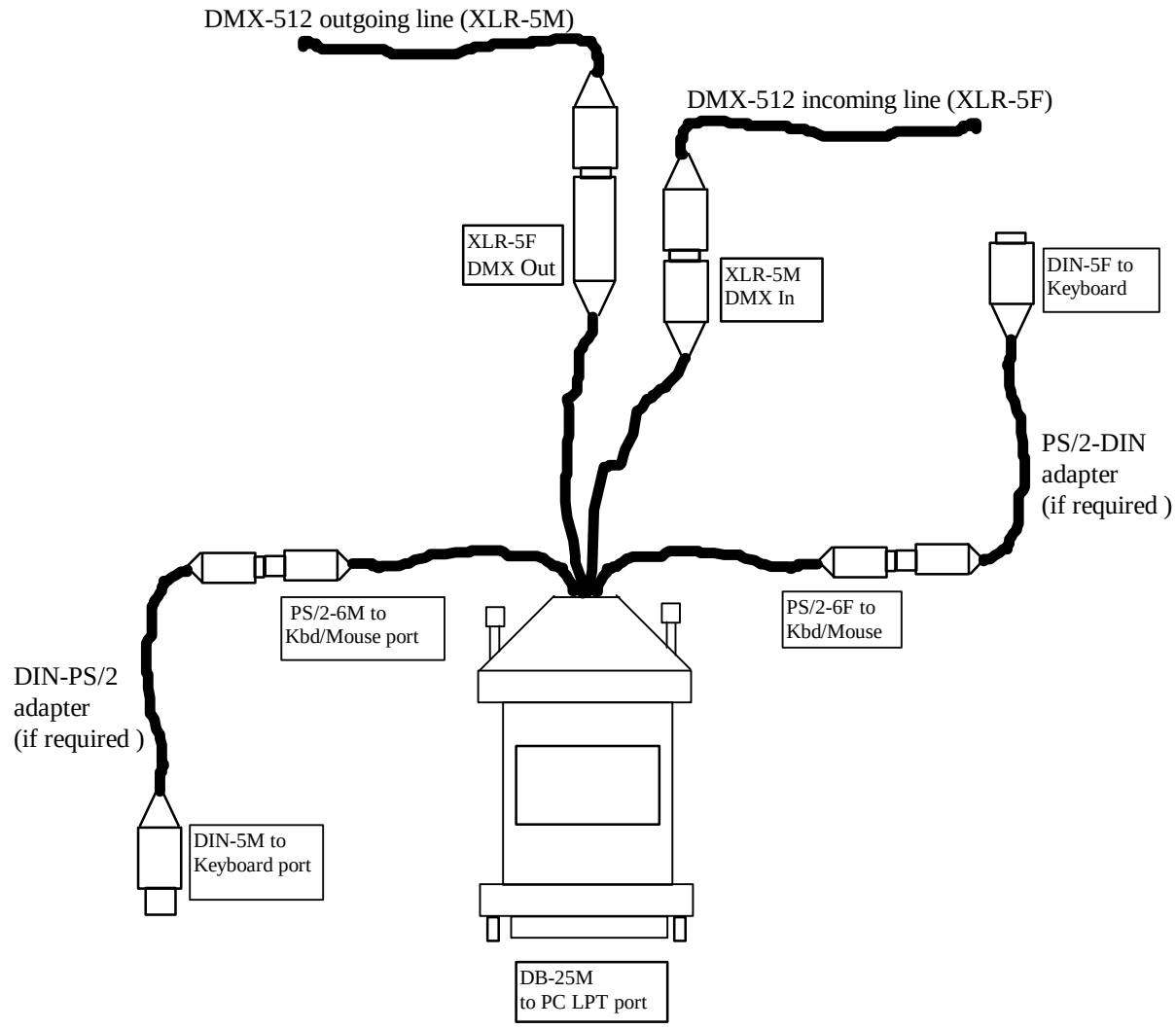

Figure 2 - DMXADP connections

3. Slave Mode operation

One of DMXADP functions is to operate as a DMX-512 signal capture device. This mode of operation is called **Slave Mode**.

While in Slave Mode, DMXADP is able acquire the signal propagated from the DMX-IN male connector. When a **DMX Capture** command is received from the LPT interface, the microcontroller of DMXADP acquires the channel state from a DMX-512 line locally and then transfers the acquired DMX frame to the CPU. All 512 channels may be captured with full 8-bit resolution.

Given the limited dynamical capabilities of the pseudo-bidirectional mode of the PC LPT interface, this operation is only applicable to static DMX-512 configurations and it is not meant to acquire cross-fade profiles or one-shot DMX configurations.

In Slave Mode the DMXADP microcontroller automatically identifies the actual number of channels (up to 512) driven by the external console and then reports back to the CPU the startcode and the string of the acquired channels with their intensity level.

In Slave Mode the Status LED is flashed every time a valid DMX configuration has been acquired. If no signal is found (missing signal or DMX-IN unplugged) the LED is not flashed and a null channel count is returned as a capture timeout condition.

4. Master Mode operation

Master Mode is entered on reception of a **DMX Drive** command from the software. In this case DMXADP hardware enables the internal DMX-512 line driver onto the DMX-OUT female connector. In Master Mode the DMX line is entirely under control of DMXADP.

In Master Mode the Status LED is toggled every four packet transmission, providing a visual indication of the DMXADP drive activity.

With the Intelligent Cable option, DMXADP has integrated source DMX-512 termination. The termination is automatically inserted on the line whenever DMXADP is set in Master Mode. In this case the DMX-IN line is automatically disconnected to avoid conflict on the DMX line when DMXADP is switched between Master and Slave modes. This feature is ideal for backup applications: when idle or switched off, DMXADP propagates the input signal from the master console, and is ready to take control of the line (insulating master console) at any time.

With Regular Cable, an XLR female termination plug must be externally connected to the far end male connector of the cable when driving DMX line in Master mode, and should not be connected when operating in Slave mode. DMXADP is capable to identify the cable type and prompt the user to disconnect DMX_IN signal and insert the termination before driving DMX.

The microcontroller of DMXADP generates DMX-512 timing following the recommendation of USITT-1990 standard, guaranteeing 44 frames/sec. The timing characteristics of the signal driven by DMXADP in Master mode are specified in **Table 1**, with reference to the parameters defined in the USITT-1990 standard (April 1990, reprinted June 14, 1990 by United State Institute of Theatre Technology, Inc.). DMXADP is able to drive any DMX device that complies with the USITT standard: in case problems are encountered with a particular DMX device refer to the device manufactorer to investigate incompatibility with USITT-1990 timing using Table 1 as a reference.

DMX-512 timing	min	max	unit
			us
Break	100	300	us
Mark-after-break	8	40	us
Inter-frame time	44	84	us
Mark-between-frame	0	40	us
Mark-after-last-channel	8	40	us
Refresh rate (512-channels)	35	44	Hz

Table 1 - DMX-512 timing

5. Status LED

Table 2 summarizes the functions of the green **Status LED** indicator (**STS**). This indicator is provided to notify the result of the microcontroller Built In Self Test and to provide a steady-state visible indication of the functions performed on the DMX-512 line.

Status LED indicator state

MASTER MODE

phase	**LED state**
initialization in progress	off
BIST OK ready for command	on
DMX-512 transmission active	flash/4 packets

SLAVE MODE

phase	**LED state**
initialization in progress	off
BIST OK ready for command	on
DMX-512 acquisition in progress	off
acquisition done, frame transfer	on
transfer done, ready for next command	on

Table 2 - Status LED functions

6. Electrical and Mechanical characteristics

DMXADP is a DC-powered device. Power is normally supplied through the PC keyboard/mouse port. Maximum current requirement is 150mA.

The DMX line interface is transient voltage and AC short protected. This minimizes chances to damage the PC in presence of voltage transients induced on the DMX line or of user miscabling that could result in shorting the AC line on the DMX lines. In any case maximum care should be put in the DMX cabling to satisfy safety and noise immunity standards.

DMXADP is housed in the standard format DB-25 gender-changer enclosure. The external dimensions (54mm wide x 17mm high x 63mm deep) make DMXADP very easily connected to all PC models, including very compact, battery operated notebooks.

7. Technical data

DMXADP V1.0	**TECHNICAL DATASHEET**
Features	Intelligent microcontroller-based DMX IN/OUT interface
Connectors	**LPT**: DB-25M Standard Parallel Port **DMX/PW**: DB-25F to DMX-in/DMX-out/Power
Indicators	**LED**: Built-In-Self-Test and DMX line traffic
DMX-512 interface	RS-485 compatible, 250Kbit/s surge and AC-short protected
Power	External 5VDC, 150mA (through provided Keyboard/Mouse port adapter cables or via optional ACADAP wall-cube adapter)
Dimensions	54mm(W) x 17mm(H) x 63mm(D)
Weight	100g

APPENDIX A: Troubleshooting

This appendix gives instructions on how to resolve some simple situations that the user may encounter when using DMXADP. For problems that cannot be resolved using this section, refer to your DMXADP dealer.

T1: Turning on the PC, the STS LED does not turn on

This indicates that either the DC power is not properly applied to DMXADP or the internal microcontroller has not passed Buil-In-Self-Test. Make sure DMXADP cable is properly connected to the Keyboard/Mouse port and recheck. Try on a different PC to exclude a defective Keyboard/Mouse port. If available, try with the external wall-cube adapter (ACADAP). If after checking power the LED does not turn-on, contact your dealer for assistance.

T2: The DMXADP software reports "Sense Timeout" errors

Someting is wrong in the communication between the PC and DMXADP. Check the connection of the LPT connector. Avoid switching power off to DMXADP while PC is still on: always power on DMXADP while powering on the PC. If the problem persists, contact your dealer for assistance.

T3: In master mode, no signal is detected by DMX receivers (dimmers, etc.)

If a new DMX appliance (receiving module) is being used, check it for full compliance with USITT DMX-512/1990. If the module is presumed to conform to the specification, verify the output of DMXADP in Master Mode with a DMX tester or another DMXADP used in Slave Mode. If problems are found with the DMX signal, contact your dealer for assistance. There are no user-replaceable parts inside DMXADP.

APPENDIX B: List of available options

This appendix lists the product codes for DMXADP and the currently available options.

ADPBPK	Base Package including: DMXADP hardware DMX/PW regular cable Terminator Plug Test Software and User's Manual (2 Floppy Disks)
ADPAPK	Advanced Package including: DMXADP hardware DMX/PW intelligent cable Test Software and User's Manual (2 Floppy Disks)
ACADAP	Wall-cube adapter option. Input 7.5-15VAC or VDC, output 5VDC
DMXDOS	Personal Console Software (MS-DOS™ version) to turn the PC in a Personal Lighting Console capable of DMXOut and DMXIn. Distributed on Floppy Disks including Software User's Manual
DMX97	Personal Console Software (Windows95™ version) to turn the PC in a Personal Visual Lighting Console capable of DMXOut and DMXIn with integrated scanner and multimedia control features. Distributed on Floppy Disks including Software User's Manual
DMXPLUS.DLL	Library for DMXPlus/DMXAdp control (Microsoft Win32-compliant) to integrate DMXADP in an OEM's custom lighting software. Distributed on Floppy Disks including User's Manual.